WE CLAIM:

1. A metal structure for an integrated circuit having copper interconnecting metallization protected by an overcoat layer, portions of said metallization exposed in a window opened through the thickness of said overcoat layer, comprising:

   a patterned conductive barrier layer positioned on said copper metallization in said window, said barrier layer forming a trough having walls conformal with said window and a trough height less than said overcoat thickness; and

   a plug of bondable metal positioned in said trough, said plug having a thickness substantially equal to said trough height so that said window is a pad suitable for wire bonding.

2. The metal structure according to Claim 1 wherein said overcoat thickness ranges from about 0.6 to 1.5 μm.

3. The metal structure according to Claim 1 wherein said overcoat comprises one or more layers of silicon nitride, silicon oxy-nitride, silicon dioxide, silicon carbide, or other moisture-retaining compounds.

4. The metal structure according to Claim 1 wherein said wall height is between 6 and 30 % less than said overcoat thickness, creating a step height of 0.1 to 0.2 μm.

5. The metal structure according to Claim 1 wherein said bondable metal is aluminum or an aluminum alloy.

6. The metal structure according to Claim 1 wherein said plug has a thickness between about 0.4 and 1.4 μm.

7. The metal structure according to Claim 1 wherein said plug has a surface on a flat level with said trough

walls.

8. The metal structure according to Claim 1 further comprising a ball bond attached to said plug.

9. The metal structure according to Claim 1 wherein said barrier layer comprises tantalum nitride.

10. The metal structure according to Claim 1 wherein said barrier layer is selected from a group consisting of tantalum, titanium, tungsten, molybdenum, chromium, vanadium, alloys thereof, stacks thereof, and chemical compounds thereof.

11. The metal structure according to Claim 1 wherein said barrier layer has a thickness between about 0.02 and 0.03 μm.

12. A metal structure for an integrated circuit having copper interconnecting metallization protected by an overcoat layer, portions of said metallization exposed in a window opened through the thickness of said overcoat layer, comprising:

a patterned conductive barrier layer positioned on said copper metallization in said window, said barrier layer forming a trough having walls conformal with said window and a trough height substantially equal to said overcoat thickness; and

a plug of bondable metal positioned in said trough, said plug having a thickness substantially equal to said trough height so that said window is a pad suitable for wire bonding.

13. A wafer-level method of fabricating a metal structure for a contact pad of an integrated circuit having copper interconnecting metallization protected by an overcoat layer including silicon nitride, comprising

the steps of:

opening a window in said overcoat layer to expose said copper metallization, said window having walls reaching through the thickness of said overcoat layer;

depositing a barrier metal layer over said wafer to cover said exposed copper metallization, window walls, and overcoat surface;

depositing a bondable metal layer over said barrier layer in a thickness sufficient to fill said overcoat window; and

chemically-mechanically polishing said wafer so that said layers of bondable metal and barrier metal are removed over said overcoat outside said window.

14. The method according to Claim 13 further comprising the step of controlling the continued chemical-mechanical polishing step so that a pre-determined amount of metal height is selectively removed from said filled window, whereby a structural step is formed from said overcoat surface to the remaining metal.

15. The method according to Claim 13 wherein said step of chemically-mechanically polishing comprises a step of coarse polishing followed by a step of fine polishing.

16. The method according to Claim 15 wherein said step of chemically-mechanically coarse polishing comprises a removal rate of approximately 400 nm/min.

17. The method according to Claim 15 wherein said step of chemically-mechanically fine polishing is selective and comprises a removal rate of approximately 100 nm/min.

18. The method according to Claim 13 wherein said step of chemically-mechanically polishing comprises a step of

coarse polishing followed by a step of etching.

19. The method according to Claim 13 wherein said controls include polishing speed, time, and temperature.

20. The method according to Claim 13 wherein said step comprises between 3 and 20 % of said overcoat thickness.